

RSTR Results from the IGUANA Test Series

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ABSTRACT

In October 1994, the Lawrence Livermore National Laboratory (LLNL), in support of the Department of Energy's (DOE) CALIOPE program, conducted a series of relatively low level, open-air, releases of industrial chemicals at Frenchman Flat in Nevada. This series of 29 open-air chemical releases is known collectively as the IGUANA test series. An existing wind tunnel at the Liquefied Gaseous Fuels Spill Test Facility (LGFSTF) was modified to produce a well characterized, exhaust plume containing various concentrations of chemical vapors and aerosols. This chemical release facility and its facility user support apparatus is known as the Remote Sensor Test Range (RSTR). It was constructed and operated by LLNL to assist DOE National Laboratory teams in the development, characterization, and testing of laser-based remote sensors of chemical effluents.

During the IGUANA test series, eleven chemicals were released, at concentrations within the wind tunnel plume from a few parts per million (ppmV) to a maximum of over 1000 parts per million. Five laser-based remote sensor systems were operated by DOE laboratory personnel from a laser trailer park located 500 m crosswind to the chemical release point. The lasers diagnosed the chemical plume. Backdrops (surfaces) constructed for each system were installed 80 m beyond the wind tunnel.

We describe the RSTR chemical release sources and the diagnostic systems employed during the IGUANA test series. We present highlights and lessons learned from this initial Caliope field test series. All together, 53 hours of release source data were acquired from the various source-related diagnostic systems during 16 days of active testing. These data have been reduced and stored in the RSTR data archive. In addition, a suite of atmospheric environmental data, including temperature, relative humidity, wind speed and direction vertical profiles and the index of refraction structure parameter, were recorded and archived.

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